

A Revolutionary Wind and Precipitation Scanning Radar for Unmanned Aerial Vehicles, Phase I

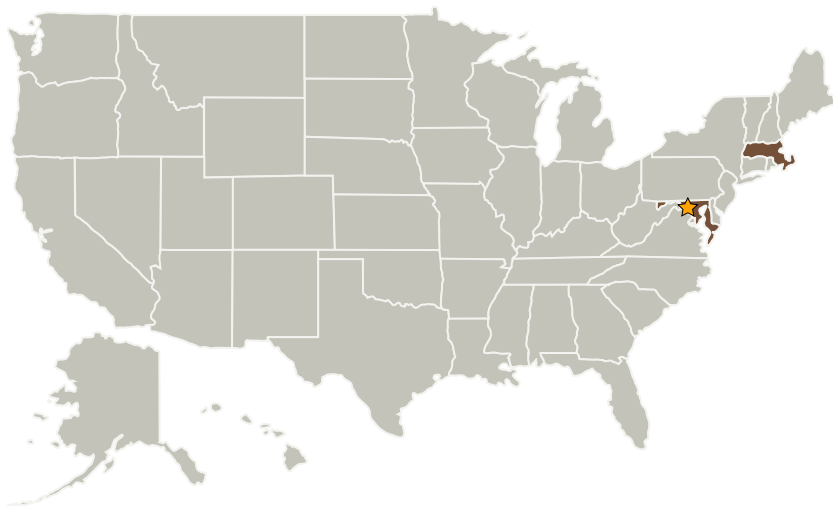
Completed Technology Project (2005 - 2006)



Project Introduction

The technical objectives for the proposed Phase I study are: 1. Develop a compact, dual-wavelength antenna system capable of electronically scanning or producing multi-beams at different incidence angles, conical scanning and generating matched beams at both wavelengths. 2. Determine the optimal frequencies for the dual-wavelength operation that balances resolution, sensitivity, atmospheric attenuation, sea clutter contamination, size and weight. This will include conducting a brief literature review to select a model or develop a model for simulating the radar response to precipitation as a function of frequency and for a range of precipitation rates. Simulation will likely be based on Mie/Rayleigh scattering and attenuation models using a Gamma drop-size distribution shape. 3. Develop a compact, power efficient dual-frequency transceiver design that is based on surface mount RF components and low-noise monolithic microwave integrated circuits (MMICs) receivers. While custom MMICs are available from several vendors, RSS and UMass will develop the low frequency RF and digital circuit board designs. 4. Investigate and develop compact, low-voltage power amplifier designs to produce high average power linear transmit signals. Design will need to operate unpressurized at the high altitudes typical of the Global Hawk UAV and similar aircraft. 5. Develop advance remote sensing algorithms to interpret the unique sampled data from the proposed instrument and retrieve high resolution maps the ABL winds, precipitation and ocean surface winds within tropical cyclones.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Remote Sensing Solutions, Inc.	Supporting Organization	Industry	Barnstable, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigators:

James D Canniff

Justin Hawthorne

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves